hairs 1.5 mm. long; flowers pale green, 16 mm. high, the segments acute.

Among small stones in barren savanna southeast of Holguin, Oriente (*J. A. Shafer 2946*).

Cactus Harlowii sp. nov.

Plants light green, 2.5 dm. high or less, simple or sometimes in clusters of 3 to 6 on the tops of old individuals. Ribs 12, rather narrow; areoles becoming glabrate, closely set (less than 1 cm. apart); radial spines about 12, slender, slightly spreading, 10 to 20 mm. long, reddish, becoming straw-colored in age; central spines 4, similar to the radials, stouter and longer, sometimes 3 cm. long, often somewhat curved; cephalium prominent, composed of white wool and fine reddish brown bristles projecting beyond the wool; flowers small, 2 cm. long, deep rose red; fruit deep red, obovoid, short, 2 cm. long; seeds black, shining.

Coastal cliffs, U. S. Naval Station, southern Oriente, March, 1909. *N. L. Britton 1965*.

Named in honor of Captain Charles Henry Harlow, U.S.N., commandant at the Naval Station at the time this interesting species was collected.

CURRENT LITERATURE

A NEW PAINT-DESTROYING FUNGUS is the title of an interesting paper by Mr. George Massee, in the *Bulletin of Miscellaneous Information of the Royal Botanic Gardens at Kew, England*, No. 8, p. 325. In this place Mr. Massee describes a new species (*Phoma pigmentivora* Mass.) which is very destructive to white paint when present in greenhouses having a high humidity and temperature. We know that certain fungi grow upon media as diverse and apparently unsuitable as dilute mineral acids, writing ink, tannic acid solutions, etc., but they do not often fruit under such conditions. However, this fungus not only grows upon the paint, but seems to flourish and even produces its fruit in abundance. At first thought it seems somewhat startling that a plant should thrive upon a medium like paint containing large amounts of lead, which is usually one of the most toxic of agents acting upon organisms. This is another example of the great

flexibility and adaptability of living protoplasm to conditions apparently unfavorable in the highest degree.

About one month after the paint has been applied it begins to be dotted with small pink specks that increase in size, and finally turn purple. These blood-stain like blotches grow until they are several inches in diameter, and, of course, by this time have completely ruined the appearance of the painted structures. The spores are now produced in dark red, warty, fruiting bodies and are then liable to infect any other paint in the vicinity. Several greenhouse painters in England complain of serious losses through this agency.

When the spores of the fungus are sown on wet white paint they germinate readily and in a few weeks produce all the characteristic effects observed in the infected greenhouses. Upon pure linseed oil the spores germinate and grow for a time, but no fruit or pigment is produced. Furthermore, upon pure white lead there was no germination at all; so, both the oil and white lead seem to be necessary for the full development of the plant. The bright red pigment is produced in oily red drops inside a colorless cell wall. The nature of this pigment is unknown, but the author's suggestion that it may be due to the formation of the red oxide of lead hardly seems tenable, judging from his description of it or from the fact that it is bleached by hydrogen peroxide. Finally it was found that paint made up to contain two per cent. of carbolic acid was wholly free from infection with the organism. Here we see lead playing the part of a favorable medium for the growth of this fungus and carbolic acid acting as a fungicide.—E. D. C.

In discussing the origin of species in nature Dr. Henry Huss (*American Naturalist* for November) says: "Whoever can devote a part of his time to the study of a genus is able to establish the existence of differences, which, formerly ignored and in themselves slight, are of the greatest importance for the tracing of relationships."

Differences between the leaves of old and young shoots, variations shown by leaves of fruiting branches and adventitious

shoots, the common heterophylly in the horseradish, sassafras, and the mulberries all show that plants must be studied throughout their various stages of development and through the seasons.

Variation in garden plants (in leaf, in flower color, shape, and arrangement) are common and are probably more important than they are usually considered. From similar variations reported from widely distributed points or at widely separated intervals the conclusion is drawn that a new form, which has appeared at various times and which because of the nature of the variation is incapacitated from reproducing itself by seed, would from this very fact constitute an ideal illustration of repeated mutation, since a hybrid origin of the individuals which appeared later, is excluded.—J. B.

There has long been the impression that desert plants must have very deeply penetrating root systems, quite oblivious of the fact that in most desert regions the soil water lies so far below the surface that many if not the majority of plants would be quite unable to develop roots capable of reaching it. Dr. Cannon* in a recent paper has shown that there is a great diversity in the root distribution of such forms. Those which grow in the flood plains of the rivers, as for instance the mesquite, may indeed have fairly deep roots, for the water table in such localities is within reach even in a desert. Those, on the other hand, which grow on the detrital slopes are much more likely to have shallow root systems which extend over a large area. In even the larger cacti, for instance, the tap-root is a negligible quantity except perhaps for anchorage and the superficial laterals spread out for a long distance. The water which the plants avail themselves of is the surface moisture which comes from the seasonal though brief and scanty rains of the region. In Tucson, Arizona, where there are two short rainy seasons, one in winter, the other in summer, the annuals show a difference in the development of their absorbing systems which is apparently due to the relative difference of air and soil temperatures at those

* W. A. Cannon, Root Habits of Desert Plants. Carnegie Institution of Washington. Publication 131, pages 1–96, Pl. 1–23; fig. in text 1–17, Mar. 28, 1911.

periods, rather than being due alone to the difference in the mean air temperature. It is impossible in so short a notice to bring to the attention of the reader all the many points of interest in this publication which merits a careful perusal.—H. M. R.

Professor Peirce in the October *Popular Science Monthly* discusses the relation of civilization and vegetation. Civilization, he says, in "the form of agriculture plays sad havoc with natural native vegetation, destroying, driving back, exterminating most, domesticating and assimilating few, plants." Incidentally, in referring to the disappearance of the wild races from which our domesticated forms have arisen as due to assimilation he asks, "What is the joy of living as a tame hen, as a domesticated cow, as a pruned pear tree? 'The ox that treadest out corn' is sure of daily food; so is 'the cock of the walk'; so also are the subjugated plants of farm and garden; but individuality has been sacrificed for safety."

The article also discusses the injury to plants from air and soil gases, smoke, and cement rust.—J. B.

THE MONARDAS: A PHYTOCHEMICAL STUDY by Miss Wakeman appeared as Part 4 of Volume 4 of the Science Series of the *Bulletin* of the University of Wisconsin. Now and then one has the pleasure of reading a publication of this type in which the problem of the relations of a group of morphologically similar plants are attacked with chemical tools and it is found that the chemical relationships are also close. The genus *Monarda* contains several representatives and all are found in North America. Many of the species have bright colors and agreeable aromatic odors, so were early used by the first settlers and probably also by the Indians as "medicine" in the treatment of disease. The species are widely distributed and they go under a number of different local names.

The red pigment of the brilliant *M. coccinea* (*didyma*) was studied as early as 1832. Later, other chemists examined the

volatile oils of different *Monardas* and found crystalline deposits in the oils after standing. Careful work upon authentic material was not done until begun under the direction of Professor Kremers at Madison. Numerous investigations have been made there, especially upon the essential oils of this group. The oils of *Monarda citriodora*, *M. didyma*, *M. fistulosa* and *M. punctata* were studied in detail. With the exception of *M. didyma* the oils all contained considerable amounts of aromatic phenols. Hydrocarbons like limonene were also present in several species. As a rule, all of the oils were light in color when freshly distilled but gradually turned darker in the course of time, probably owing to oxidation. This led the investigators to look for easily oxidizable substances and their search was successful, for they found that thymoquinone and certain of its derivatives were present in the oils. Now, the quinones, as a class, are often colored or yield brightly colored red, orange, or yellow substances after chemical treatment. We have here a group of closely related plants that contain substances of similar structure from the chemical point of view. A study of the part these substances play in the pigmentation of the plant was then undertaken.

The pigments of the different *Monardas* give to their flowers the red, yellow, brown and purple colors that make them attractive. These pigments are extracted with various solvents. The colors of each are different, but upon chemical study they all appear to be derived from one or two closely related mother-substances, among which thymoquinone has been obtained in the form of beautiful yellow crystals. Substances of this type give brilliantly colored final or intermediate oxidation products. It was found that the *Monardas* contain oxidases or oxidizing ferments (destroyed by heat) that can oxidize these color-producers from one stage to another with accompanying change of hue. Many investigators consider that numerous other cases of pigment formation in plants are due to the action of these oxidases upon various colorless constituents of the plant. The question of pigment production is one of growing interest among both botanists and chemists. The present publication is a valuable contribution to our understanding of this problem.

Miss Wheldale, in England, has recently published two papers that are very interesting in the same connection. One is "The Chemical Differentiation of Species," *Biochemical Journal* **5**: 445 (1911); and the other is "The Colours and Pigments of Flowers with Special Reference to Genetics," *Proceedings of the Royal Society*, Series B, **81**: 44 (1909).—E. D. C.

Under the authorship of M. F. Barrett of the State Normal School at Upper Montclair, New Jersey, there has appeared a "LEAF KEY TO THE GENERA OF THE COMMON WILD AND CULTIVATED DECIDUOUS TREES OF NEW JERSEY." The author apparently realized the impossibility of determining the different genera of trees by leaf characters alone, and frequent use is made of other but equally obvious characters. Used under the guidance of a teacher knowing the trees, the key should prove a useful pamphlet to the beginner. Some of the distinctions drawn between genera, the hickories and walnuts for example, require more botanical judgment than the unaided beginner is apt to have, but the key will be a great help in class work, where the instructor exercises considerable interpretative helpfulness. Copies may be procured from the above address and cost only ten cents each. —N. T.

The September *Mycologia* includes an article by Bruce Fink on the nature and classification of lichens; it consists chiefly of collected statements of various botanists with reference to considering lichens as a distinct class. About 83 per cent. of the 115 botanists consulted believe that the lichens should be maintained as a distinct group of plants; the balance would distribute them among other fungi to the exclusion of the group Lichenes. Forty botanists favored maintaining LICHENES, considering it a natural group. Europeans are more favorable to this division than Americans. Convenience for study is evidently considered an additional argument for maintaining the group.—J. B.

We are pleased to mention Publication No. 1 of the Botanical Society of Western Pennsylvania, issued Nov. 27, 1911. It has

been projected for the publication of articles, not too deep and extended, upon the flora of the western part of the state. Besides the proceedings of the Club and reports of the administrative character, it contains papers on the Pteridophytes of Allegheny County, The Fungal Flora of Pittsburgh, and Rambles in Panama and Jamaica. It has all of the characteristics of a well-edited and interesting journal covering a local area.—N. T.

A review (*Plant World*, July, 1911) of Fitting's recent paper dealing with the relation of osmotic pressure of the cell sap in plants to arid habitats gives some interesting figures concerning the pressure found in leaf cells. The reviewer, E. B. Livingston, says that "we find that the highest pressure developed by those desert forms is more than *thirteen* times what we have hitherto considered as *usual*. They are perhaps three times as great as the pressure observed in grass stems by Pfeffer. Hereafter the highest pressures observed by ordinary green plants must be cited as at least over 100, perhaps as high as 130 atmospheres, or even higher."—J. B.

PROCEEDINGS OF THE CLUB

October 25, 1911

The meeting of October 25, 1911, was held in the Museum Building of the New York Botanical Garden at 3:30 P.M., Vice-President Barnhart presiding. Fifteen persons were present.

The scientific program consisted of informal reports on the summer's work. Dr. N. L. Britton discussed the genus *Camer-aria* L. and illustrated his remarks by specimens and illustrations of the known species, together with those of an undescribed one found by him at the United States Naval Station, Guantanamo, Cuba. He also remarked on the large number of undescribed species of plants in many genera contained in the recent Cuban collections of the New York Botanical Garden.

Dr. Marshall A. Howe gave a brief résumé of a paper on "Some